

for each network node, assigning an internal link from the electronic node to each optical channel node only if an associated OEO transmitter is available for the corresponding optical channel associated with a particular one of the available wavelengths  $\lambda_1$  through  $\lambda_m$ , and assigning an internal link to the electronic node from each optical channel node only if an associated OEO receiver is available for the corresponding optical channel associated with a particular one of the available wavelengths  $\lambda_1$  through  $\lambda_m$ ;

for each optical transmission link, assigning an optical channel link between a pair of optical channel nodes of corresponding network nodes only if the corresponding optical channel is available on the associated optical transmission link;

and assigning costs to the internal links and the optical channel links.

3. (as originally filed) The method of claim 2 wherein the costs assigned to the internal links are related to OEO conversion costs.

4. (as originally filed) The method of claim 2 wherein the costs assigned to the optical channel links are related to costs of the corresponding optical transmission links.

5. (presently amended) The method of claim 2 wherein applying the single-source shortest path algorithm includes applying Dijkstra's algorithm.

10. (presently amended) [The apparatus of claim 9 wherein transforming comprises]  
Apparatus for a network node in a network having plural nodes interconnected with optical transmission links, the apparatus comprising:

a processor;

a memory connected to the processor;

a plurality of optical-electrical-optical (OEO) transmitters and receivers; and

a computer program, in the memory, for:

assigning an electronic node to each network node, the electronic node representing an electronic switching fabric interconnecting optical- electrical-optical (OEO) transmitters and receivers of the network node;

assigning optical channel nodes to each network node, each optical channel node representing an optical cross-connect for an optical channel available at the network node;

for each network node, assigning an internal link from the electronic node to each optical channel node only if an associated OEO transmitter is available for the corresponding optical channel associated with a particular one of the available wavelengths  $\lambda_1$  through  $\lambda_m$ , and assigning an internal link to the electronic node from each optical channel node only if an associated OEO receiver is available for the corresponding optical channel associated with a particular one of the available wavelengths  $\lambda_1$  through  $\lambda_m$ ,

for each optical transmission link, assigning an optical channel link between a pair of optical channel nodes of corresponding network nodes only if the corresponding optical channel is available on the associated optical transmission link; and

assigning costs to the internal links and the optical channel links.

**11.** The apparatus of claim 10 wherein the costs assigned to the internal links are related to OEO conversion costs.

**12.** The apparatus of claim 10 wherein the costs assigned to the optical channel links are related to costs of the corresponding optical transmission links.

**13.** (presently amended) A computer program product for determining an optimal path between a source node and a destination node in an optical network having plural network nodes interconnected with optical transmission links, the computer program product comprising a computer usable medium having computer readable code thereon, including program code which:

assigns an electronic node to each network node, the electronic node representing an electronic switching fabric interconnecting optical-electrical-optical (OEO) transmitters and receivers of the network node;

assigns optical channel nodes to each network node, each optical channel node representing an optical cross-connect for an optical channel available at the network node;

assigns an internal link from the electronic node to each optical channel node only if an associated OEO transmitter is available for the corresponding optical channel associated with a particular one of the available wavelengths  $\lambda_1$  through  $\lambda_m$ , and assigning an internal link to the electronic node from each optical channel node only if an associated OEO receiver is available for the corresponding optical channel associated with a particular one of the available wavelengths  $\lambda_1$  through  $\lambda_m$ ;

assigns an optical channel link between a pair of optical channel nodes of corresponding network nodes only if the corresponding optical channel is available on the associated optical transmission link;

assigns costs to the internal links and the optical channel links; and

selects an optimal path by applying a single-source shortest path algorithm.

14. (presently amended) A computer data signal comprising a code segment for determining an optimal path between a source node and a destination node in an optical network having plural network nodes interconnected with optical transmission links, the computer data signal including instructions to:

assign an electronic node to each network node, the electronic node representing an electronic switching fabric interconnecting optical-electrical-optical (OEO) transmitters and receivers of the network node;

assign optical channel nodes to each network node, each optical channel node representing an optical cross-connect for an optical channel available at the network node;

assign an internal link from the electronic node to each optical channel node only if an associated OEO transmitter is available for the corresponding optical channel associated with a particular one of the available wavelengths  $\lambda_1$  through  $\lambda_m$ , and assigning an internal link to the

electronic node from each optical channel node only if an associated OEO receiver is available for the corresponding optical channel associated with a particular one of the available wavelengths  $\lambda_1$  through  $\lambda_m$ ;

assign an optical channel link between a pair of optical channel nodes of corresponding network nodes only if the corresponding optical channel is available on the associated optical transmission link;

assign costs to the internal links and the optical channel links; and

select an optimal path by applying a single-source shortest path algorithm.